Table 3–22. Minority and Low-Income Populations in Grand and San Juan Counties

Population Group	Grand County	San Juan County
2000 population	8,485	14,413
Percent Hispanic or Latino	5.6	3.7
2000 population by race	8,373	14,195
White Non-Hispanic (percent)	7,861 (94%)	5,876 (41%)
Black or African American (percent)	21 (0.3%)	18 (0.1%)
American Indian (percent)	327 (4%)	8,026 (57%)
Some other race (percent)	164 (2%)	275 (2%)
Percent of people below 1997 poverty level	18	30
Percent change 1989–1997	34	–10

Source: 2000 Census

Demographic information obtained from the U.S. Census Bureau was used to identify low-income and minority populations within 50 miles of the Moab site and the proposed off-site alternatives (Klondike Flats, Crescent Junction, and the White Mesa Mill). This radius is consistent with that used to evaluate collective dose for human health effects from the proposed on-site and off-site disposal of the Moab mill tailings and contaminated material from vicinity properties. Census data are compiled at a variety of levels corresponding to geographic areas. In order of decreasing size, the areas used are states, counties, census tracts, block groups, and blocks. A "block" is geographically the smallest census area; it is usually bounded by visible features such as streets or streams or by invisible boundaries such as city limits, township lines, or property boundaries and offers the finest spatial resolution. Block data were used to characterize minority distribution. Because block data are so specific to the individuals within a block (for example, sometimes only one family may live in a block), income data are available only at the block group level and above. For this reason, block group data were used to identify low-income populations.

Demographic maps were prepared using 2000 census data for minority populations and for low-income populations. Figure 3–23 shows census blocks with minority populations that are more than 50 percent within 50 miles. The nearest block occurs about 20 miles south of Moab.

The poverty level established by the Census Bureau for 2000 for a family of four is $18,244. Figure 3–24 shows average household income for the year 2000. Assessment of the census data determined that within the 50-mile area, less than 1 percent of the population had a household income below the poverty level.

3.2 Klondike Flats Site

The proposed Klondike Flats disposal site (Klondike Flats site) is located about 18 miles northwest of the Moab site and just west of US-191. It is remote from populations and behind a low bluff such that the Klondike Flats site is not visible from the highway.

Air quality in this area would be considered similar to and likely better than air quality at the Moab site. There are no major sources of pollutants and no developed industries; regular vehicle use does not occur in the area under consideration. The Moab region is classified as an attainment area under the NAAQS; therefore, the Klondike Flats site is also considered to be an attainment area according to these standards, and air quality is not considered further.

There are no perennial streams in or near this area; therefore, aquatic ecology is not considered further. Ephemeral streams are present throughout the region; the washes in the Klondike Flats site area may carry heavy flows after significant storm events. The course of these ephemeral water bodies is well established, and these washes are unlikely to migrate in a different direction or pattern; therefore, the potential for river migration is not considered further.

Any future use as a disposal site would require importing potable water and exporting nonradioactive solid and sanitary waste. An existing three-phase distribution line parallels US-191 adjacent to the site that is within the service territory of Utah Power.

3.2.1 Geology

The Klondike Flats site is in the north part of the Canyonlands section in the north-central part of the Colorado Plateau physiographic province. The surface of the site slopes gently westward, and the elevation ranges from about 4,600 to 4,750 ft. The site is in the northwest part of the ancestral Paradox Basin, which is discussed in Section 3.1.1 (Figure 3–1).

3.2.1.1 Stratigraphy

Bedrock exposed at the site is the lower part of the Mancos Shale (Figure 3–25). Approximately 300 to 700 ft (estimated) of Mancos Shale is present in the Klondike Flats site area. Just west of the site, an old oil test well (Klondike well) penetrated about 700 ft of Mancos Shale at its total depth (Doelling 1997; Lupton 1914).

The following members (in descending order) represent the lower part of the Mancos Shale in this area: Blue Gate Shale, Ferron Sandstone, and Tununk Shale. Approximately 100 to 200 ft of the lowermost part of the Blue Gate Shale Member is present in the western part of the site.

The Ferron Sandstone Member is exposed in the eastern and southern parts of the site. The lowermost member of the Mancos, the Tununk Shale, is exposed in the slope below the Ferron Sandstone cuesta around the east and south margins of the site area. The Dakota Sandstone of Early Cretaceous age underlies the Mancos Shale and consists of 50 to 100 ft of resistant sandstone, conglomeratic sandstone, and conglomerate. This formation likely represents the shallowest bedrock unit containing ground water. The Cedar Mountain Formation of Early Cretaceous age underlies the Dakota Sandstone and consists of one or two beds up to 30 ft thick of sandstone, conglomeratic sandstone, and conglomerate separated by thick, gray-green and lavender mudstone. The total thickness of the formation is 100 to 200 ft.

Bedrock (Mancos Shale) exposures are covered in some of the western part of the site by alluvial mud (Doelling 1997). These deposits fill swales in poorly developed drainages between bedrock ridges of Blue Gate Shale. Mostly residual, these deposits of mud, silt, and clay formed as the shale weathered; thickness is up to 20 ft.

3.2.1.2 Structure

The site is in a prominently exposed structural feature known as the Courthouse syncline. The surface expression of the syncline is hyperbolic and is well-defined by the Ferron Sandstone double cuesta. The site area roughly straddles the syncline axis, which runs approximately across Section 36, from its northwest to southeast corners. The southwest flank of the syncline terminates along the Moab Fault system and its northwest extension, the Moab splay faults (Figure 3–3).

Age	Formation and Member	Thickness (ft)
Late Cretaceous	Mancos Shale, Blue Gate Shale Member	Up to 3,000 preserved at Crescent Junction Site
	Mancos Shale, Ferron Sandstone Member	60
	Mancos Shale, Tununk Shale Member	250–300
Early Cretaceous	Dakota Sandstone	50–100
	Cedar Mountain Formation	100–200
Jurassic	Morrison Formation, Brushy Basin Member	200–400
	Morrison Formation, Salt Wash Member	150–250
	Curtis Formation, Moab Member	80–110
	Entrada Sandstone, Slick Rock Member	200–300
	Carmel Formation, Dewey Bridge Member	100–200
	Navajo Sandstone	300–500
	Kayenta Formation	150–300
	Wingate Sandstone	200–300
Triassic	Chinle Formation	200–800
	Moenkopi Formation	Up to 1,500
Permian	Cutler Formation	Up to 1,500
Pennsylvanian	Honaker Trail Formation	Up to 2,000
	Paradox Formation	Up to 12,000

Figure 3–25. Generalized Stratigraphic Column for the Klondike Flats and Crescent Junction Alternative Disposal Sites

No faults are obvious in the Klondike Flats site area. A minor northeast-striking normal fault, inferred by Doelling (1997), extends northeast and ends in Section 35.

3.2.1.3 Geologic Resources

There are no known oil and gas resources in this area. Evaporite deposits, such as potash and rock salt, occur in the Paradox Formation in the Salt Valley salt-cored anticline about 8 miles northeast of the Klondike Flats site area. However, no commercially viable deposits are present at the site.

Some minor uranium and vanadium deposits are known to occur in this area at a depth of 1,500 to 3,000 ft; however, this depth makes further exploration of such deposits uneconomical. No sand and gravel deposits are present at the site.

3.2.1.4 Geologic Hazards

Montmorillonite, a clay that is characterized by its ability to swell and shrink, is found in the Mancos Shale that is exposed over most of the area (Mulvey 1992). Changes in water content cause the shrinking and swelling, which leads to subsidence and is known to be the cause of highway road damage because of heave of concrete slab structures present over the Mancos Shale. Wetting of the shale surface from rainstorms often causes unimproved roads to be impassable for several days. No hazard exists at the site for landslides, slumping, or rock falls because of the low slopes and homogeneity of the Mancos Shale bedrock.

Earthquake risk and seismic activity in this area are low. The site is in Uniform Building Code 1, indicating lowest potential for earthquake damage (Olig 1991). The nearest faults with Quaternary movement are about 1 to 1.5 miles to the west and southwest of the site and are associated with the Moab splay faults (Hecker 1993).

The site has a high radon-hazard potential for occurrence of indoor radon because of the naturally occurring geologic factors of uranium concentration, soil permeability, and ground water depth (Black 1993). The high rating stems from the relatively high concentration of naturally occurring uranium in Mancos Shale, the relatively high soil permeability caused by shrinking and swelling of the Mancos-derived soil, and the relatively deep depth to ground water (shallow water retards radon migration to the atmosphere).

3.2.2 Soils

The more widespread soil classification units at the site are the Chipeta Complex in upland areas and the Toddler, Ravola, Glenton families in alluvial fans, drainages, and floodplains.

The surface is covered with less than 18 inches of Chipeta silty clay loam or Chipeta Complex soils. These soils have low infiltration characteristics (0.06 to 0.2 inch per hour) and are highly erodible (SCS 1989). These strongly saline, strongly alkaline, relatively well-drained clayey soils are generally shallow; weathered shale is often within 5 to 20 inches of the surface. Slopes vary from 0 to 10 percent. Hydrocollapse and subsidence potential are low. Liquefaction potential is also low because no liquefiable materials or conditions are present.

Grouped together, the Ravola, Toddler, and Glenton soil families occur on the floodplains of the major drainages to the north and west of the marine shale slopes that dominate the landscape. Some of the drainages are deeply incised. Soils of all three families are very deep and well-drained. The soil families grade one into another across the landscape and vary primarily in the origin of the alluvium within which they formed.

Water erosion hazard is moderate; however, the soils are subject to gully formation and piping where runoff is concentrated. Toddler family soils formed in alluvium derived from a mixture of marine shale to the north and east and sandstone to the south and west and are moderately to strongly saline. Runoff is slow and the erosion hazard is moderate. The Glenton soils, formed in alluvium derived mainly from sandstone, are very deep, are well-drained, and exhibit fairly rapid permeability. Runoff is moderate to slow and erosion hazard is relatively low; however, deep gullies have formed in areas where runoff is concentrated.

Cryptobiotic soil crusts and associated pedestal soil are found within the Klondike Flats site area. The cryptobiotic soil crusts reduce soil loss and are evidence of light to moderate grazing. A rock veneer also occurs over much of the site. Lag layers of surface rock can form by winnowing, frost heaving, and movement of soil gases during and after rain. Large and small burrows are common on the site, possibly dug by kangaroo rats, ground squirrels, and badgers. Burrowing is evidence that soils are being churned and that the Klondike Flats site is an active habitat.

Table 3–23 identifies soil properties associated with the Chipeta Complex and Ravola, Toddler, and Glenton soil families.

3.2.3 Climate and Meteorology

The closest available weather statistics are from the National Weather Service Canyonlands Field Airport meteorological station, located 2 to 4 miles southeast of the site. Weather information is available for only a short period from June 1998 to January 2002. Mean annual temperature is 55.6 ºF; temperatures have ranged from –2 ºF in January to 107 ºF in August.

Average annual precipitation is 9.2 inches; frequency for precipitation events greater than 0.125 inch is less than 10 percent of the time. Most of the precipitation occurs during the southwest monsoon season, July to September. Most surface water flow in the Klondike Flats site area is from infrequent large thunderstorm events that occur in the late summer part of the monsoon season. The potential annual evaporation is 55 to 60 inches, which greatly exceeds annual precipitation (Robson and Banta 1995).

Average wind direction is from the north most of the time, as shown on Figure 3–26. Wind speed monitored at Canyonlands Field Airport indicated that 24 percent of the time the wind blows less than 1 mph, and 5 percent of the time the wind blows greater than 9 mph (Figure 3–27).

3.2.4 Ground Water

3.2.4.1 Hydrostratigraphy

Ground water in the Klondike Flats area occurs in several aquifers ranging from the Dakota Sandstone and Cedar Mountain Formation of Cretaceous age to the Navajo Sandstone of Jurassic age. Few data exist to evaluate ground water resources in the Courthouse syncline area; bedrock aquifers are largely untested, and only a few water wells are present in the area. The near-surface hydrostratigraphic unit (all geologic units younger than the Moenkopi Formation of Triassic age) includes aquifers consisting of sandstone and coarse unconsolidated units. This hydrostratigraphic unit is characterized by many perched zones and local systems with short flow paths. Local precipitation is the source of recharge, which occurs when winter snows melt and during the infrequent summer and early fall thundershowers (generally restricted to small areas).

Water percolates downward through fractures and weathered rock into the sandstone units. Water generally moves a short distance through the aquifer and is then lost through intermittently flowing springs and seeps. Discharge rates are low; many springs and seeps flow during the spring and are dry during other seasons.

3.2.4.2 Ground Water Occurrence

In 1994, Grand County Solid Waste Management drilled a well (Landfill No. 1) to a depth of 500 ft through the Ferron Sandstone Member and into the base of the Mancos Shale near the county landfill north-northwest of the site (Figure 3–28). The hole was dry and was abandoned. The Ferron Sandstone Member consists of a relatively thin set of resistant sandstone beds approximately 250 to 300 ft above the base of the Mancos Shale and is not a water-bearing unit. During earlier minerals exploration drilling, most or all of the Mancos Shale drilled was dry. It was concluded that the Mancos Shale does not yield ground water and that it forms an aquitard that inhibits ground water migration to deeper stratigraphic units (Blanchard 1990).

Limited data are available to assess ground water quality in the Dakota Sandstone or Cedar Mountain Formations at the site. Three wells have been drilled in which ground water was present at depths between 400 and 500 ft. Ground water may be present in these formations, but additional investigation would be necessary to determine if the quantities and yield are significant.

Ground water is present in the Brushy Basin and Salt Wash Members of the Morrison Formation at depths from 600 to 2,500 ft (Blanchard 1990). The Brushy Basin Member is composed largely of bentonitic shale that has a tendency to seal itself if it becomes fractured. This unit acts mainly as an aquitard. The Salt Wash Member forms an aquifer that is composed of lenticular fluvial sandstone deposits interbedded with siltstone and shale. The Salt Wash Member is not recognized as a regional aquifer and probably has limited production compared to eolian sandstone units below it.

The Moab Member of the Curtis Formation and the Slick Rock Member of the Entrada Sandstone are sandstone beds in the site area that have a high potential for containing usable ground water. However, no local well data are available to determine the water resource potential of the Curtis or Entrada Formations in the Klondike Flats site area.

The Navajo Sandstone, approximately 1,500 to 2,000 ft beneath the land surface, is the first significant water-producing aquifer in the area beneath the proposed site and is a major ground water resource throughout the region. Specific capacities of two water-supply wells at the entrance to Arches National Park, completed in the Navajo Sandstone, were 1.7 and 14.5 gpm per foot (Blanchard 1990).

3.2.4.3 Ground Water Quality

Ground water quality from potential aquifers in the Dakota Sandstone and Cedar Mountain Formation beneath the Klondike Flats site has not been determined. Ground water collected from a flowing well south of Cisco and from a spring east of the Klondike Flats area had TDS concentrations of 1,470 and 1,020 mg/L, respectively (Blanchard 1990). This would be classified as drinking water under the Utah Ground Water Quality Protection Regulations (UAC 2003a).

Ground water in the Salt Wash and Brushy Basin Members of the Morrison Formation has highly variable TDS concentrations ranging from 1,020 to 25,700 mg/L (Blanchard 1990). No data are available to evaluate local ground water quality in the Salt Wash Member.

Ground water in the Entrada Sandstone is generally good quality, with TDS concentrations typically less than 220 mg/L (Doelling and Morgan 2000). Ground water sampled from an Entrada Sandstone well approximately 1 mile south of the Klondike Flats area has a TDS concentration of 300 mg/L (Blanchard 1990). The Entrada Sandstone contains much higher concentrations of TDS in the deep subsurface. TDS concentrations in nine deep wells (depths of 900 to 5,300 ft) in the Entrada Sandstone north of I-70 between Crescent Junction and Cisco range from 9,470 to 104,000 mg/L (Blanchard 1990). One of these wells is approximately 5 miles north of the Klondike Flats area and contains a TDS concentration of 10,300 mg/L at 1,750 ft.

Ground water quality in the Navajo Sandstone is generally good; concentrations of TDS average less than 220 mg/L (Blanchard 1990). The water type is calcium bicarbonate or calcium magnesium bicarbonate, and the water is moderately hard to hard.

3.2.4.4 Ground Water Use

The Navajo Sandstone is the most important source of drinking water in Moab Valley, about 20 miles southeast of the Klondike Flats area (Eisinger and Lowe 1999). Wells in the Navajo Sandstone produce more than 1,000 gpm of high-quality water for the city of Moab water supply (Sumsion 1971). Numerous springs flow from the Navajo Sandstone where it is exposed about 5 miles south of the site. Flow from these springs is less than 10 gpm but is sufficient to provide water for a few cattle (Doelling and Morgan 2000).

The Hagen No. 1 Tenmile Wash (also known as Queen) well, approximately 4 miles west of the site, was drilled to 920 ft. Fresh water is present in white sandstone at a depth of 425 ft, and the well was converted to a water well (McKnight 1940; Doelling 1997). Salty water issued from another aquifer at a depth of 600 ft. The specific water-bearing units were not identified (McKnight 1940), but the depths and the location on the geologic map by Doelling (1997) indicate that the water is likely from the Dakota Sandstone and Cedar Mountain Formation.

Ground water use from two wells approximately 1 mile southeast and 1 mile north of the site reportedly completed in the Dakota Sandstone or Cedar Mountain Formation (Airport Well No. 2 and MIC-1, respectively) has not been confirmed and is under investigation.

Four water wells were drilled on state sections in the vicinity of Dalton Wells (approximately 4 miles southeast of the airport) (Utah Division of Water Rights 2004). No information is provided in the files, but a preliminary field check indicates that these wells are providing water for crop irrigation. The size of drilling equipment observed on the site in March 2002 suggests that the likely target would be the Navajo Sandstone. Figure 3–28 provides the locations of domestic wells in the Klondike Flats area.

3.2.5 Surface Water

3.2.5.1 Surface Water Resources

The Klondike Flats site is located near a surface water divide between the Colorado and Green Rivers. Tenmile Wash flows southwestward from Klondike Flats to the Green River. Another unnamed wash drains southeastward from the site toward Canyonlands Field Airport, and it eventually joins Bartlett and Klondike Washes, which discharge to Courthouse Wash and the Colorado River. Headwaters emanating from the Klondike Flats site area drain small areas. All of these washes are ephemeral, are dry much of the year, and are ungaged. Extreme floodwater surface elevations or the effects of these storm events are unknown.

3.2.5.2 Surface Water Quality

Water bodies in the Klondike Flats site area consist primarily of ephemeral washes that are dry most of the year. Flow occurs in these washes primarily after significant storm events. No information is available on water quality during these events; however, it is expected that the water would be heavily loaded with sediment from surface water collection coming off Mancos Shale. Soils associated with Mancos Shale are alkaline and may have high concentrations of selenium. It would be expected that the water quality of flows through these washes would be characterized as saline, very turbid, having considerable hardness, and having elevated levels of sulfate and selenium. Surface water use is limited to a few stock-watering dams**.**

3.2.5.3 Water Quality Standards

All ephemeral water bodies in the Klondike Flats site area eventually flow into either the Green River or the Colorado River; therefore, they are subject to the classifications specified in Utah Administrative Code R317-2-13 for the affected segments of both the Green and the Colorado Rivers and their tributaries (see Chapter 7.0).

3.2.6 Floodplains

No perennial rivers or streams and no floodplains are present at the Klondike Flats site. The site contains numerous ephemeral washes where surface flooding occurs, but these areas are not floodplains.

3.2.7 Wetlands

No wetlands are known to exist at the site, but because riparian vegetation is present in places, the area would be investigated for any small, isolated wetlands prior to construction. Appendix F includes a more detailed description of floodplains and wetlands at the Klondike Flats site.

3.2.8 Terrestrial Ecology

This section discusses the existing vegetation and wildlife, including threatened and endangered species and sensitive species, at the Klondike Flats site. The Klondike Flats site is within an area designated by the BLM as moderate to heavy use. The presence of human-related features, such as Canyonlands Field Airport to the south and the Grand County landfill to the northwest, may serve as limiting factors in the density and diversity of wildlife species present, such as larger mammals with large home ranges. The presence of human activity (primarily recreation) in this area further limits wildlife diversity and densities.

3.2.8.1 Terrestrial Vegetation and Wildlife

The vegetation on Chipeta soil (see Section 3.2.2) within the Klondike Flats site area is close to the potential natural vegetation as described in the Grand County Soil Survey (SCS 1989). In upland areas, vegetation is dominated by low saltbushes (mat and Gardner saltbush [*Atriplex corrugata* and *Atriplex gardneri*]) with scattered plants of bud sagebrush (*Picrothamnus desertorum*), galleta, Indian ricegrass, and desert trumpet (*Eriogonum inflatum*). Prickly pear cactus, a grazing increaser in upland areas, is a potential indicator of past overgrazing. A few hedgehog cacti (*Echinocereus* spp.) were also observed in upland areas. At the confluence of drainages where greater amounts of moisture occur seasonally, vegetation consists of abundant rubber rabbitbrush with a relatively dense understory of galleta. This is evidence that a slight increase in moisture can significantly increase plant abundance.

Plant abundance and diversity are very low, even for arid rangeland, because the low-permeability soils promote rapid runoff, have low available water capacity, and are often highly saline. Rooting depths vary from 5 to 20 inches. The plant community consists primarily of low shrubs, which includes mat saltbush and Gardner saltbush with occasional shadscale and bud sagebrush. A desert shadscale/saltbush community dominates habitat in this area. The existing low-growing vegetative cover is limited and sparse (about 50 percent cover), which reflects the low rainfall characteristic of the desert ecosystem and possibly overgrazing by cattle. Vegetation growing on Chipeta Complex soils has limited value for grazing because of the low productivity and poor palatability of dominant species.

Table 3–24 provides vegetation characteristics associated with soil types in the proposed Klondike Flats site area. Russian thistle, rabbitbrush, prickly pear cactus, and snakeweed are known to occur in the area. As shown in Table 3–24, the potential vegetation of the Ravola-Toddler-Glenton soils may consist of greater than 50 percent grasses that are palatable to livestock, such as Indian ricegrass and galleta, and these soils, therefore, have a somewhat higher value for grazing than Chipeta soils on nearby marine shale hills. The ephemeral washes support greasewood and tamarisk and also provide valuable cover for wildlife (BLM 1995).

Wildlife population diversity and densities are limited by sparse vegetation and poor habitat. This area is also likely to support fewer and less diverse wildlife populations than the Moab site because of the lack of water. However, large mammals adapted to a desert environment, such as the pronghorn antelope (*Antilocapra americana*), may inhabit the area to the north of the Klondike Flats site area. Smaller wildlife populations adapted to a desert environment, including mammal, bird, and reptile populations, are also present. Upland areas have poor forage and cover for wildlife. Nearby pockets of black greasewood provide cover for some birds and smaller mammals such as white-tailed prairie dog and black-tailed jackrabbit.

No critical winter or summer range has been identified for wildlife for the Klondike Flats site area.

3.2.8.2 Threatened and Endangered Species

This section describes federally listed terrestrial threatened and endangered, proposed, or candidate species that are or may be present in the Klondike Flats site area. In March 2003, DOE requested an updated list of such species from USF&WS that may be present or affected by DOE's proposed alternatives. USF&WS responded in April 2003 with a list for Grand County. Table 3–25 lists a subset of those species that may occur in the vicinity of the Klondike Flats site.

Table 3–25. Federally Listed Threatened and Endangered Species Potentially Occurring in the Vicinity of the Klondike Flats Site

Common Name	Scientific Name	Habitat Present and Affected	Species Present	Status	Comments
Jones' cycladenia	*Cycladenia humilis* var. *jonesii*	Possible	Possible	Threatened	
Black-footed ferret	*Mustela nigripes*	No	No	Endangered	
California condor	*Gymnogyps californianus*	No	No	Endangered	
Mexican spotted owl	*Strix occidentalis lucida*	Possible	Possible	Threatened	
Bald eagle	*Haliaeetus leucocephalus*	Possible	Possible	Threatened	Proposed for Delisting

Spatial data for the species listed in Table 3–25 were obtained from the Utah Conservation Data Center (UCDC). This data set was compiled by the Utah Natural Heritage Program (UNHP) of UDWR, in which species occurrences are depicted as points at a scale of 1:24,000 on 7.5-minute topographic quad maps. Spatial data depicting the Klondike Flats site were overlaid on the species of concern spatial data to evaluate known species occurrences in the area.

The status of each of these species in the vicinity of the Klondike Flats site is briefly discussed below. Appendix A1, "Biological Assessment," provides more detailed information concerning these federally listed species that may be in the vicinity of the Klondike Flats site or could be affected by activities at the site.

There is a cluster of known populations of Jones' cycladenia on BLM land in Grand County approximately 11 to 17 miles northeast of Moab (UDWR 2003b). However, there are no known occurrences of the species on the Klondike Flats site.

UDWR (2003b) reported an unconfirmed ferret sighting in the vicinity of the Klondike Flats site in 1989. All black-footed ferrets currently in the wild are believed to be the result of a federal reintroduction program. It is highly unlikely that the black-footed ferrets reintroduced in Uinta and Duchesne Counties in 1999 or their offspring could occur on or in the vicinity of the Klondike Flats site.

Surveys for white-tailed prairie dogs (currently in review for federal listing) have been conducted at the Klondike Flats site (BLM 1995). At that time, it was determined that all the colonies were relatively small and isolated, such that they would not support black-footed ferrets.

A UDOT environmental study (UDOT 2002b) included the California condor as potentially occurring in the Klondike Flats area in sparsely inhabited mountain ranges, mesas, and open rangeland. However, based on habitat needs, it is unlikely that this species exists in the vicinity of the site.

Data provided by UDWR (2003a) indicated that there were no occurrences of the Mexican spotted owl in any of the project areas. However, habitat models (BLM 2003b) indicate that potential habitat areas may exist in the canyons near US-191 over the first 7 miles north from the Moab tailings pile. Nonetheless, these models are primarily based on physical and topographic features and do not consider vegetation requirements. Mexican spotted owls nest, roost, and forage in an array of different community types, but mixed-conifer forests dominated by Douglas fir and/or white fir are most common (USF&WS 2001). However, they may also nest, but less

frequently so, in arid, rocky, mostly unvegetated canyons (Romin 2004). Although there are no forested areas in the vicinity of US-191 north of Moab, there are arid canyons that largely or altogether lack forest-type vegetation. Thus, it is unlikely but possible that spotted owls occur in the canyons near US-191 over the first 7 miles north of the Moab site. It is, thus, even more unlikely that spotted owls occur at the Klondike Flats site.

The Utah Gap Analysis (UDWR 1999) indicates that potential high-quality bald eagle wintering habitat exists throughout many of the project areas. However, it is not known to nest or night roost nor is it known to have been observed in the vicinity of the Klondike Flats site.

There is no designated or proposed critical habitat for any of the above federally protected species in the vicinity of the Klondike Flats site.

DOE, in consultation with USF&WS and BLM, would determine the need for additional habitat evaluations and surveys for species that may be affected by the proposed action should this alternative be selected.

3.2.8.3 Other Special Status Species

Special status species are those that are protected under federal and state regulations other than the ESA, which include the MBTA, Executive Order 13186, and Birds of Conservation Concern (USF&WS 2002f). The State of Utah maintains a list of species that it considers threatened, endangered, or otherwise of concern; other federal agencies such as BLM and USFS also maintain lists of species considered to be sensitive. UDWR notified DOE of species that should be considered under this EIS (UDWR 2003b). Although the special status species are not covered by the ESA and are therefore not subject to Section 7 consultation, USF&WS encourages protection of these species.

Table 3–26 lists sensitive plant species that may occur in the site region and are considered by state and federal resource management agencies to be of concern. A number of species listed by the State of Utah or considered sensitive by BLM are potentially present in the vicinity of the Klondike Flats site.

Table 3–27 includes animal species listed by the state to be of concern and may be present in the project region. The list includes all species identified by UDWR as potentially occurring in Grand County; in some cases, the known populations or suitable habitat are not close to the Klondike Flats site. Some species have been eliminated from the site list because of site-specific habitat.

Table 3–28 lists sensitive bird species, including birds protected under the MBTA, that may occur in the vicinity of the site, although current on-site habitat may limit typical nesting and breeding activities. Most of these species are protected under the MBTA, which prohibits take or destruction of birds, nests, or eggs of listed migratory birds.

Birds of primary concern are the burrowing owl (*Athene cunicularia*), Swainson's hawk, ferruginous hawk, and peregrine falcon. Although these species are not federally listed species, they are included on the state list and are also protected under the MBTA. Because of previous sightings, it can be assumed that the peregrine falcon and ferruginous hawk may be present.

Table 3–28. Sensitive Bird Species Protected Under the Fish and Wildlife Conservation Act and Migratory Bird Treaty Act That May Occur Near the Klondike Flats Site

Species	Potential To Occur in Project Area
Order Falconiformes—Birds of prey	
Golden eagle *(Aquila chrysaetos)*	High
Northern harrier *(Circus cyaneous)*	Moderate
Prairie falcon *(Falco mexicanus)*	Moderate
Red-tailed hawk (*Buteo jamaicensis*)	High
Turkey vulture (*Cathartes aura)*	High
Order Gruiformes—Marsh and open country birds	
Black rail *(Laterallus jamaicensis)*	Moderate
Yellow rail *(Coturnicops noveboracensis)*	Low
Order Strigiformes—Nocturnal birds of prey	
Barn owl *(Tyto alba)*	Low
Flammulated owl *(Otus flammeolus)*	Low
Short-eared owl *(Asio flammeus)*	Low
Order Apodiformes—Small swallowlike birds	
Black swift *(Cypseloides niger)*	Low
Vaux's swift *(Chaetura vauxi)*	Low
Order Passeriformes—Perching birds	
Olive-sided flycatcher *(Contopus borealis)*	Low
Gray flycatcher *(Empidonax wrightii)*	Moderate
Pinyon jay *(Gymnorhinus cyaneocephalus)*	Low
Bendire's thrasher *(Toxostoma bendirei)*	High
Crissal thrasher *(Toxostoma dorsale)*	High
Bewick's wren *(Thryomanes bewickii)*	Moderate
Sedge wren *(Cistothorus platensis)*	Low
Verry *(Catharus fuscenscens)*	Moderate
Sprague's pipit *(Anthus spragueii)*	Low
Loggerhead shrike *(Lanius ludovicianus)*	Moderate
Gray vireo *(Vireo vicinior)*	Moderate
Virginia's warbler *(Vermivora virginiae)*	Moderate
Black-throated warbler *(Dendroica nigrescens)*	Low
Grace's warbler *(Dendroica graciae)*	Low
Blackpoll warbler *(Dendroica striata)*	Low
Dickcissell *(Spiza americana)*	Low
Sage sparrow *(Amphispiza belli)*	Low
Cassin's sparrow *(Aimophila cassinii)*	Low
Brewer's sparrow (*Spizella breweri)*	Moderate
Lark bunting *(Calamospiza melanocorys)*	High
Baird's sparrow *(Ammodramus bairdii)*	Low
Grasshopper sparrow *(Ammodramus savannarum)*	Low
McCown's longspur *(Calcarius mccownii)*	Low
Chestnut-collared longspur *(Calcarius ornatus)*	Low

Note: Birds listed in the table are protected under the Fish and Wildlife Conservation Act (Birds of Conservation Concern [2000] [USF&WS 2002f] and the MBTA [50 CFR 10], Executive Order 13186). Species listed as threatened or endangered under the ESA or considered endangered, threatened, or rare by the State of Utah are not included here.

Burrowing owl habitat may exist in the vicinity of white-tailed prairie dog colonies. Although burrowing owls have not been documented as occurring in the vicinity of the Klondike Flats site, prairie dog burrows may provide suitable habitat for nesting.

3.2.9 Land Use

The Klondike Flats site area is located in Grand County, Utah, on land administered by BLM. The area under consideration is approximately 18 miles northwest of the city of Moab and west of US-191 and the Union Pacific Railroad. Arches National Park is approximately 3.5 miles east of US-191 (see Figure 3–18).

The general area is undeveloped land administered by BLM. A portion of the site area under consideration is designated for disposal in BLM's resource management plan (BLM 1983). The Grand County landfill is located adjacent to the area identified for disposal. BLM has stated that it would pursue necessary real estate actions to have adjacent areas available for a disposal site.

The nearest commercial property is the Canyonlands Field Airport, which is immediately southeast of the Klondike Flats site area. Four employees live at the airfield year-round, and up to seven employees live at the airport during peak season (Albrecht 2003). There are no other nearby residents. Access to the Grand County landfill is approximately 1 mile north of the Klondike Flats site area and 1 mile west of US-191 on CR-236. Crescent Junction and the I-70 interchange are approximately 10 miles north along US-191.

The area surrounding and including the Klondike Flats site is available for recreation and other uses; existing roadways limit access. However, several dirt roads are used for recreational access. Favorable weather allows recreational access for hikers, campers, mountain bikers, and off-highway vehicles during most of the year. Most of the recreational activities occur south and west of the Klondike Flats site along CR-138, also known as the Blue Hills Road. This road provides access to desirable areas to the west that are used mainly for mountain biking and all-terrain vehicles. Although the amount of recreational use west of the site is unknown, it is possible that as many as 53,000 recreational use visits occurred in 2002. This estimate is based on vehicle counts on Blue Hills Road. An off-highway vehicle play area is located southwest of Canyonlands Field Airport. The track was established in the 1970s and fell into disuse; however, in recent years it has had renewed interest and use because of the popularity of all-terrain vehicles and motorcycles. An estimated 1,000 user-days per year occur at this track. Peak use occurs during the spring and fall.

In addition to recreation, BLM allows grazing, oil and gas leasing, and mining claims. The Klondike Flats site area is part of the Big Flat grazing allotment, which is currently under a grazing permit until 2013. There are no mineral, oil, or gas leases in effect for the potential site, and BLM has closed this area to any new leases.

Two sections of land to the south and southeast of the site are administered by the State of Utah SITLA. SITLA administers sections of land throughout the state with the express mandate of maximizing the value of the holdings for use by the state's educational institutions. SITLA contains provisions for easements or rights-of-way crossings.

3.2.10 Cultural Resources

The cultural history of the Klondike Flats site is included in the more general cultural history of southeastern Utah described in Section 3.1.13.1; the Class I cultural resource inventory that was conducted for this site is described in Section 3.1.13.2.

Results of the Class I inventory indicate that Class III cultural resource surveys have not been conducted on most of the Klondike Flats site. Two sites have been recorded within the boundaries of the site, but neither has been recommended as eligible for inclusion in the National Register of Historic Places. Both are located on the site margin adjacent to US-191, where numerous linear surveys have been conducted. An additional seven sites have been recorded immediately adjacent to the eastern boundary of the site, again, where linear surveys associated with projects that parallel US-191 have been conducted.

The potential for cultural resources to occur in unsurveyed portions of the site is high on the basis of soil types and adjacent surveys. Cultural site densities of 22.4 to 27.4 sites per square mile are predicted for the soil types and landforms found on the site (Berry 2003). Class III cultural resource surveys from areas approximately 1 to 10 miles to the west and southwest of the site indicate densities of 20 or more cultural sites per square mile in some instances. The surveys indicate the presence of Paleoindian, Archaic, Formative (represented by Anasazi), and historic sites (Berry 2003).

No data exist concerning the presence of potential traditional cultural properties on the Klondike Flats site. On the basis of Class I cultural resource inventory results, tribal interviews, and published and unpublished literature, the likelihood of their occurrence and their estimated density on the site are low (on a scale of low-medium-high-extremely high) for traditional cultural properties associated with the Ute Mountain Ute Tribe, White Mesa Ute Tribe, Southern Ute Tribe, and Navajo Nation. The likelihood of occurrence and their estimated density on the site are medium for traditional cultural properties associated with the Uintah-Ouray Ute Tribe and Hopi Tribe (Fritz 2004).

3.2.11 Noise and Vibration

The Klondike Flats site is located in a quiet desert environment where natural phenomena such as wind, rain, and wildlife account for most natural background noise. The acoustic environment in open desert in Utah is typical of other desert environments where average L_{dn} range from 22 dB on calm days to 38 dB on windy days (Brattstrom and Bondello 1983). Sources of man-made background noise may include automobile traffic on US-191 (about 1 mile away), trains on the Union Pacific Railroad, aircraft flying overhead, a landfill located near the site, and outdoor recreational activity.

Neither background noise nor ground vibration data are available for the Klondike Flats site. Estimated average background noise for the site from natural and man-made sources is about 45 dBA, but could exceed 55 dBA within 1,300 ft of US-191. No residences are in the immediate surrounding areas, and the land is used for outdoor recreation.

3.2.12 Visual Resources

The Klondike Flats site is remotely located on the back slopes of the bluffs that border the western side of US-191. It is characterized by gently rolling, buff-colored hills that are dotted with prickly pear cactus and low-growing shrubs (Figure 3–29). From a distance, the horizontal and diagonal lines of the landscape features are smooth and unbroken except for an occasional drainage. From most viewing locations on the site, the background scenery is composed of red-rock cliffs and sandstone mesas. Most of the site is not visible to travelers on Blue Hills Road or US-191 because it is shielded by the steep bluff side slopes that parallel both of these roads.

Figure 3–29. View Northeast of the Klondike Flats Site

Although no roads or trails currently cross the Klondike Flats site, it may be viewed occasionally by off-road recreationists who stray from existing roads and trails. BLM (2003b) classifies visual resources in this area as Class III (see Section 3.1.15 for an explanation of visual resource classes).

3.2.13 Infrastructure

With few exceptions, the infrastructure that currently supports the Moab site (see Section 3.1.16) is the same for the Klondike Flats site area. Nonpotable water is obtained from the Moab site at the river water pump station and transported to the Klondike Flats site. Potable water is obtained from the city of Moab and transported to the Klondike Flats site. A Utah Power three-phase overhead distribution line runs along US-191, approximately 3 miles from the disposal cell area.

3.2.14 Transportation

Section 3.1.17 provides details related to area federal, state, and county road use. Table 3–15 in Section 3.1.17 provides AADT, level of congestion, truck percent, and accident rates for US-191 from Moab to Crescent Junction. Table 3–16 in Section 3.1.17 provides monthly traffic at the junction of SR-279 and US-191. Figure 3–21 illustrates area access possibilities.

AADT on US-191 in the Klondike Flats area is low and contains high percentages (30 percent) of truck traffic. Of the AADT of 2,855 vehicles, an estimated 856 vehicles would be trucks. Between Blue Hills Road (CR-138) and SR-313, accident rates increase above expected rates but are still close to expected rates identified for similar highways (Ames 2003).

As shown on Figure 3–21, the Union Pacific Cane Creek Branch Railroad parallels US-191 between Crescent Junction and Moab. However, just south of CR-138 (Blue Hills Road), the railroad track goes under US-191 and continues south on the west side of US-191. As discussed in Section 3.1.17, current rail usage on the segment between Moab and the main line at Crescent Junction is limited to one train per week that hauls freight from the Moab Potash and Salt Mine on SR-279.

The Canyonlands Field Airport (see Figure 3–21) provides commuter and scenic air tour services. A local aviation company operates the airport and services 22 fixed-wing flights a day year-round. There are three daily commercial flights by an airline carrier; the remaining flights are a combination of charter and scenic flying services. An average of one helicopter flight per day year-round provides mostly fuel service (Albrecht 2003).

3.2.15 Socioeconomics

The Klondike Flats site is situated 18 miles north of the Moab site in Grand County, Utah. Section 3.1.18 discusses Grand County socioeconomic characteristics. The Canyonlands Field Airport is the only commercial employer in the site area. It employs 11 full-time employees year-round; of that number, four people live at the airport year-round and seven employees live there during the peak season. There are no other commercial businesses or residences in the site area.

3.2.16 Human Health

3.2.16.1 Background Radon/Natural Radiation

Nationwide, people are exposed to an average of about 300 mrem/yr of natural background radiation (NCRP 1987). Table 3–29 summarizes the radiation doses from natural background, assuming residential exposure is occurring at the Klondike Flats site.

Table 3–29. United States and the Klondike Flats Site Natural Background Radiation Doses

Source	U.S. Average Natural Background Radiation Dose (millirem/yr)	Klondike Flats Natural Background Radiation Dose (millirem/yr)
Cosmic and cosmogenic radioactivity	28	68
Terrestrial radioactivity	28	74
Internal radioactivity	40	40
Inhaled radioactivity	200	260
Rounded Total	**300**	**440**

The largest natural source is inhaled radioactivity, mostly from radon-222 and its radioactive decay products in homes and buildings, which accounts for about 200 mrem/yr. Additional natural sources include radioactive material in the earth (primarily external radiation from the uranium and thorium decay series), radioactive material in the body (primarily potassium-40), and cosmic rays from space filtered by the atmosphere.

The actual radiation dose from natural background radiation varies with location. According to data for Blanding, the radiation dose from cosmic and cosmogenic radioactivity is about 68 mrem/yr at the Klondike Flats site; the dose from external terrestrial radioactivity is about 74 mrem/yr; and the dose from radon-222 and its radioactive decay products is about 260 mrem/yr (IUC 2003). The total natural background radiation dose at the Klondike Flats site would be about 440 mrem/yr, considerably higher than the national average.

No one currently resides at the Klondike Flats site, and only 15 people live within 10 miles of the site. According to 2000 census data, the population within 50 miles of the Klondike Flats site was about 10,500 (Figure 3–30). Assuming that all residents were exposed to 440 mrem/yr, the population dose would be about 4,600 person-rem per year.

3.2.17 Environmental Justice

Several small pockets of minority populations greater than 50 percent of the total population within a census block are found south and east of the Klondike Flats site within 50 miles from the site. As shown in Figure 3–31, there are no areas with minority populations greater than 50 percent of the total population closer than 20 miles to the site. Approximately 94 percent of Grand County was identified by the census as white, non-Hispanic. One census group block area with a reported annual household income less than $18,244 is identified about 30 miles north of the site (Figure 3–32).

3.2.18 Pipeline Corridor

3.2.18.1 Geology

Seismicity (and seismic risk) is low in this part of the northern Paradox Basin and has a low rate of occurrence with small- to moderate-magnitude earthquakes (Wong and Humphrey 1989). The proposed slurry pipeline route is in Uniform Building Code 1, indicating the lowest potential for earthquake damage (Olig 1991).

Geologic conditions for subsidence and landslides were evaluated in the EIS for the Questar, Williams, and Kern River pipeline route, which closely follows the proposed pipeline route from the Moab site to Klondike Flats (DOI 2001). In that EIS, no risks for landslides, soil liquefaction, or collapsible soils were noted for the Moab site to Klondike Flats portion of the pipeline route.

The northernmost 3 miles of the proposed pipeline route crosses over the lower part of the Mancos Shale, which contains expansive clay (montmorillonite) that can potentially cause engineering geologic problems. Changes in water content cause the clay to shrink and swell, leading to subsidence or heave of concrete slab structures.

3.2.18.2 Soils

Soils within the proposed pipeline corridor between the Moab site and the Klondike Flats site are formed primarily on marine shale uplands and pediments and on alluvial fans and drainages consisting of sediments derived from nearby shale and sandstone uplands. Three general soil map units occur along this segment of the proposed pipeline corridor from south to north: Rock Outcrop-Nakai-Moenkopi, Chipeta-Killpack-Blueflat, and Toddler-Ravola-Glenton (SCS 1989).

3.2.18.3 Ground Water

Depths to ground water vary widely along the length of the proposed pipeline corridor from the Moab site to the Klondike Flats site. For the first mile of the pipeline corridor northwest of the Moab site, ground water is in Quaternary alluvium and detritus in Moab Wash at depths less than 100 ft. For the next 6 to 7 miles through Moab Canyon to about Sevenmile Canyon, the pipeline corridor is on the southwest (upthrown) side of the Moab Fault, where ground water is several hundred feet deep in sandstone of the Cutler or Honaker Trail Formations. North of Sevenmile Canyon, where the proposed pipeline corridor is on the northeast (downthrown) side of the Moab Fault, ground water would be in the Entrada Sandstone at estimated depths of 200 to 500 ft. About 4 miles north of Sevenmile Canyon along the pipeline route are seeps at the base of the Cedar Mountain Formation, and ground water is shallow in the Cedar Mountain Formation or Dakota Sandstone for about the next 2 miles to where Bartlett Wash comes in from the west. For the last 3 to 4 miles, where the pipeline corridor turns to the west and passes over increasing thicknesses of Mancos Shale, ground water depths to the Dakota Sandstone increase from 200 to about 700 ft.

3.2.18.4 Surface Water

No perennial surface waters are present within the pipeline corridor. The proposed slurry pipeline corridor extending north from the Moab site to the Klondike Flats site would cross several streams and washes (Moab Wash, Sevenmile Wash, Klondike Wash, and Tusher Canyon Wash) and numerous other smaller, unnamed drainage features, all of which are ephemeral. Storm water runoff in the local ephemeral streams is characterized by a rapid rise in flow rates, followed by rapid recession, primarily because of the small storage capacity of the surface soils in the area. The flows in these drainage features occur primarily in response to local heavy rainfall and occasionally to snowmelt runoff.

Water Quality and Existing Surface Water Contamination

When storm water flows through washes within this proposed pipeline corridor, the water is laden with sediment, and water quality is anticipated to be poor. These ephemeral washes collect surface water runoff from areas composed predominantly of the Mancos Shale Formation, which are highly alkaline and may have high concentrations of selenium. As a result, surface water quality from these drainage features would likely be characterized as having high salinity, turbidity, and hardness and having elevated levels of sulfate and selenium.

Relevant Water Quality Standards

All ephemeral water bodies in this proposed pipeline corridor are eventually tributaries to either the Green River or the Colorado River; therefore, they are subject to the water quality classifications specified in Utah Administrative Code R317-2-13 (see Chapter 7.0).

3.2.18.5 Floodplains and Wetlands

No known floodplain or wetland areas would be affected by the pipeline corridor.

3.2.18.6 Terrestrial Ecology

Section 3.2.8 describes the affected environment for terrestrial ecology on a regional basis between the Moab site and the Klondike Flats site (Maps 2–4, Appendix C). This section addresses only the areas, wildlife, and habitat that would be affected by the proposed pipeline corridor. General information applicable to the regional descriptions as described in Section 3.2.8 is not repeated in this section. Although vegetation is sparse and habitat is limited, large mammals adapted to a desert environment, such as the pronghorn antelope, coyote, and black-tailed jackrabbit, are anticipated to be present intermittently in the proposed corridor.

Recreational activities (e.g., motorized off-highway vehicles) on the west side of US-191 and highway traffic from Moab limit wildlife diversity and densities. However, the desert bighorn sheep is a Utah species of high interest and is known to frequent area transportation corridors (US-191 and the Union Pacific Railroad) from the Moab site as far north as 14 miles toward the Klondike Flats site (Maps 3 and 4, Appendix C). The desert bighorn prefers rocky, relatively steep slopes characteristic of the area between Moab and the Klondike Flats site. Road traffic has resulted in mortality to this species.

Table 3–25 in Section 3.2.8.2 presents a list of federally listed threatened and endangered species that may occur in the vicinity of the Klondike Flats site. Appendix A1, "Biological Assessment," provides more detailed information concerning these species. Of these species, the black-footed ferret, Mexican spotted owl, and bald eagle, as described in Section 3.2.8.2, are the primary federally listed species of concern in the vicinity of the pipeline corridor. In addition, the white-tailed prairie dog, currently in review for federal listing, is also of concern.

UDWR (2003b) reported an unconfirmed sighting of black-footed ferrets in the vicinity of the Klondike Flats site in 1989. All black-footed ferrets currently in the wild are believed to be the result of a federal reintroduction program. It is highly unlikely that the black-footed ferrets reintroduced in Uinta and Duchesne Counties in 1999 or their offspring could occur along the pipeline corridor between the Moab site and the Klondike Flats site. The black-footed ferret is of concern particularly along the northernmost sections of the pipeline route. However, the route's proximity to US-191 and its limited potential for suitable habitat for more than 80 percent of the area likely limit the potential for the ferret's presence. An environmental assessment conducted for the Grand County Landfill (BLM 1995), which is located within 3 miles of the Klondike Flats site, concluded that there is no present or historical evidence of black-footed ferrets.

However, white-tailed prairie dog colonies, upon which the ferret depends, may be located in the vicinity of this segment of the proposed pipeline corridor just south of the Klondike Flats site. Surveys for white-tailed prairie dogs have been conducted at the Klondike Flats site (BLM 1995). At that time, it was determined that all the colonies were relatively small and isolated, such that they would not support black-footed ferrets.

Data provided by UDWR (2003a) indicated that there were no occurrences of the Mexican spotted owl in any of the project areas. However, habitat models (BLM 2003b) indicate that potential habitat areas may exist in the canyons near US-191 over the first 7 miles north from the Moab site. Nonetheless, these models are primarily based on physical and topographic features and do not consider vegetation requirements. Mexican spotted owls nest, roost, and forage in an array of different community types, but mixed-conifer forests dominated by Douglas fir and/or white fir are most common (USF&WS 2001). However, they may also nest, but less frequently

so, in arid, rocky, mostly unvegetated canyons (Romin 2004). Although there are no forested areas in the vicinity of US-191 north of Moab, there are arid canyons that largely or altogether lack forest-type vegetation. Thus, it is unlikely but possible that spotted owls occur in the canyons near US-191 over the first 7 miles north of the Moab site.

The Utah Gap Analysis (UDWR 1999) indicates that potential high-quality bald eagle wintering habitat exists throughout many of the project areas. However, it is not known to nest or night roost nor is it known to have been observed in the vicinity of the proposed pipeline corridor between the Moab site and the Klondike Flats site.

There is no designated or proposed critical habitat for any of the above federally protected species in the vicinity of the proposed pipeline corridor between the Moab site and the Klondike Flats site.

DOE, in consultation with USF&WS and BLM, would determine the need for additional habitat evaluations and surveys for species that may be affected by the proposed action should this transportation mode be selected.

The burrowing owl (Cresto 2003), ferruginous hawk, peregrine falcon, and Swainson's hawk are not federally listed species, but they are included on the state list of sensitive species and are also protected under the MBTA. On the basis of previous sightings, it can be assumed that the peregrine falcon and ferruginous hawk may be present. Studies conducted for the Grand County landfill (BLM 1995) identified ferruginous hawk sightings in the vicinity of the pipeline corridor.

3.2.18.7 Land Use

The slurry line route from the Moab site to the Klondike Flats site is approximately 18 miles. Where possible, the pipeline would be located in an existing right-of-way permitted across federal lands administered by BLM, which constitutes approximately 37 percent of the entire route. Approximately 7 percent of the route would be located on national park lands, 16 percent on private lands, and the remaining 40 percent on state and sovereign lands. If co-location of the proposed slurry line is not feasible or practical, DOE would obtain a new permit from BLM, and the pipeline would parallel the existing right-of-way. Proposed pipeline corridors are shown on Maps 2 through 4 in Appendix C.

3.2.18.8 Cultural Resources

The cultural history of the proposed Klondike Flats pipeline route is discussed in the more general cultural history of southeastern Utah described in Section 3.1.13.1; the Class I cultural resource inventory that was conducted for this corridor is described in Section 3.1.13.2.

Results of the Class I inventory indicate that a number of linear Class III cultural resource surveys associated with existing pipelines and US-191 have been conducted along the proposed pipeline corridor between the Moab and Klondike Flats sites. On the basis of these surveys, 25 sites have been identified that are either eligible for inclusion in the National Register of Historic Places or have been recommended as eligible. An additional site, the Dalton Wells Civilian Conservation Corps/Japanese-American Internment Camp (Map 3, Appendix C), is listed on the National Register. The 25 sites include historic sites associated with transportation, mining, ranching, and agriculture; prehistoric lithic scatters of unknown affiliation; a small

number of Formative and Archaic period sites; small rock art sites; and possibly protohistoric (immediately preceding recorded history) sites. No Paleoindian sites have been recorded along the corridor, and it is not likely that they would occur.

No data exist concerning the presence of potential traditional cultural properties along the proposed Klondike Flats pipeline route. On the basis of Class I cultural resource inventory results, tribal interviews, and published and unpublished literature, the likelihood of their occurrence and estimated density on the site are low (on a scale of low-medium-high-extremely high) for traditional cultural properties associated with the Navajo Nation and medium for properties associated with the Ute Mountain Ute Tribe, White Mesa Ute Tribe, Southern Ute Tribe, and Hopi Tribe. The likelihood of their occurrence and estimated density are medium to high for properties associated with the Uintah-Ouray Ute Tribe (Fritz 2004).

3.2.18.9 Visual Resources

The proposed pipeline route between the Moab and Klondike Flats sites passes through narrow Moab Canyon, just north of the Moab site (Map 4, Appendix C), and the gently rolling desert plains north of Moab Canyon to the Klondike Flats site (Maps 2 and 3, Appendix C). Moab Canyon, characterized by steep, rugged, red sandstone cliffs, has a visual resource designation of Class II (BLM 2003b) (see Section 3.1.15 for an explanation of visual resource classes). The natural environment in the canyon has been altered somewhat by a number of cultural modifications, such as US-191, the Cane Creek Branch rail line, an overhead transmission line, and several buried pipelines. For the most part, however, the dominant features within the canyon are not the cultural modifications but the imposing sandstone cliffs. North of the canyon, the rolling desert plains are designated Class III (approximately 70 percent of the route) and Class IV (approximately 10 percent of the route) (Map 4, Appendix C).

The desert plains are characterized by undulating topography that is scattered with small desert shrubs and grasses. The background scenery along the pipeline corridor in these Class III and IV areas is composed of moderately rugged red and beige sandstone mesas and cliffs containing predominantly horizontal and diagonal features. Near the Klondike Flats site, background scenery changes to the smooth, rounded, buff-colored bluffs of the Mancos Shale.

The route proposed for the pipeline is visible to travelers on US-191 for most of its length. An approximately 4-mile stretch of the route is not entirely visible from the highway but is visible to recreationists and other travelers on the county road (historic US-160) that parallels US-191 along Moab Canyon. The proposed south access portion of the pipeline route is visible to recreationists and other travelers on Blue Hills Road (CR-138).

3.3 Crescent Junction Site

The proposed Crescent Junction disposal site (Crescent Junction site) is located about 2 miles north of the Crescent Junction interchange on I-70 and US-191. The site is about 31 miles north of the Moab site and covers several square miles of largely desert terrain that is bordered on the north by the prominent Book Cliffs. All drainage to the Green River, which ultimately flows to the Colorado River, is located several miles west of the site. Because no perennial streams or rivers are on the Crescent Junction site, aquatic ecology and surface water contamination and use are not discussed.